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NAME AND ADDRESS DATE

A DIETARY STUDY OF A CASE OF DIABETES MELLITUS

by

LEE PERCY MEHLIG

A Thesis Submitted for the Degree of

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I Diabetes Mellitus.

Salomon and Hirsch have given the best historical accounts of the disease. Hippocrates made no reference to it in his writings. Celsus, in the first century, described a disease characteoized by polyuria, wasting and bodily weakness. Aretaeus in 150 A. D. was the first to use the term diabetes. The word is from the greek meaning syphon. He noted the thirst, diuresis and the striking emaciation. The writings of Galen indicate that he was familiar with the main symptoms of the disease. The ancient Hindoo physicans of India are credited with having been familiar with the sweet taste of diabetic urine. This characteristic is said by Hirsch to have been described in the Ayur Veda of Susruta, written in the sixth century. In a Cingalese treatise of the fifteenth century, diabetic urine was referred to as "Modu mehe" or honey urine. Notwithstanding these references to the sweetness of urine, the credit for pointing out this characteristic is universally attributed to Thomas Willis, who described it in his "Pharmacentice Rationalis", published first in 1674. On page 71 of Pordage's translation of this treatise, which appears in the 1684 edition of this author's complete works, the following statement occurs: " But as to what several authors say that, the drink is little or nothing changed, there is no truth in their suggestion; because in all people (that ever happened to know, and I believe it to be so in all) their urine was very different not only from the drink that they took in, but also from any humors that are usually generated

in our bodies, being exceeding sweet, as if there had been sugar and honey in it." It was not until 1776 a century later, that Mathew Dobson, of Liverpool demonstrated that the urine contained saccharine matter, by evaporating down two quarts of diabetic urine and obtaining a cake of sugar weighing 2 ounces. He noted that urine lost its sweet taste when it fermented. He also stated that the blood serum was sweet.

Rollo's advocacy, in 1797, of a meat diet in the treatment of diabetes, marks an epoch in its history. He was the first to give a detailed and intelligent account of the disease. In 1849, Claude Bernard demonstrated that, in animals, puncture of a point in the floor of the fourth ventricle near the tip of the calamus scriptorius and between the nucles of the vagus and auditory nerves, causes a transitory glycosuria. In 1885, he discovered the glycogenic function of the liver. A great advance in our knowledge of the disease was furnished, in 1889, by Minkowski and Von Mering, who demonstrated that complete extirpation of the pancreas in various animals regularly caused a permanent diabetes. In 1900, Opie and others pointed out the association between degeneration of the island of Langerhans of the pancreas and the existance of glycosuria. The investigations of Otto Cohnheim published in 1903 and 1904, and purporting to show that the carbohydrates of the system are normally burnt up by the interaction of glycolytic bodies formed in the pancreas and muscles, promise, if eventually confirmed, to go far toward elucidating many hitherto obscure points in the metabolism in diabetes mellitus.

Diabetes is a disorder of carbohydrate and fat metabolism characterized usually by progressive loss in weight, thirst and polyuria, and by the persistent excretion of glycose in the urine while the individual is on a diet containg only moderate amounts of carbohydrates, or in certain instances, even when no carbohydrates are ingested.
Osler's Modern Medicine.

The etiology of this disease is at the present time unknown. What is knownabout the disease tends to make us believe that it is carbohydrate disorder characterized by a lack of the body to burn this food. The lack is closely associated with several of the glands of the body more expecially the pancrease, adrenal and possibly the parathyroids and the hypophysis. The infuence of heredity also bears a relationship to this disease. This is shown in the case her reported in which all of the patients brothers and sisters are effected by the disease. It has been suggested that this disease was of an infectious nature but no proof whatever has been given for this statement and at the present time no one credits infection as playing a part in this condition except that an infectious pancreatitis might result in diabetes. A person of any age is liable to the disease but is is more frequently found in patients between fifty and sixty years of age. As to the sex, the males are much more prone to the disease than are the females, it occuring in the ration of four to three. Obesity is also of importance in this condition because of its close relationship to the fat metabolisin in the body and acidosis.

Central nervous system involvement is not of much importance except in experimental work on in connection with syphilis and sclerosis trauma of the central nervous system, or severe mental shock has been known to produce a permanent glycosuria. The most important theory as to the cause of diabetes has been brought out by the work of Minkowski and Von Mering. They worked on the extirpation of the pancreas in dogs and found that in nearly every case in which complete extirpation of the pancreas was performed a permanent glycosuria followed. The work of Opie has shown that it is the islands of Langerhans in the pacreas that exert this influence on the carbohydrate metabolism. He has demostrated that whenever there is extensive degeneration of these areaes in the pancreas there is invariably a glycosuria. There have been cases however, in which complete degeneration of the pancreas showed no glycosuria. Nevertheless the general belief is that the islands of Langerhans do give something to the blood which materially aids the body to burn carbohydrates., Cohnheim has shown that by mixing an extract of pancreas with a sugar solution no effect was noted this was also true with an extract of muscle but when the pancreatic and muscle extracts were both added to the sugar solution the sugar was converted to carbondioxide, water and alcohol. Subsequent workers have not been able to confirm this work of Cohnheim but further works along this line may lead to the elucidation of this disease. From this we see that the pancreas gives to the blood a hormon which interacts with some body in the tissues to allow the oxidation of the carbohydrates. The liver even in a condition of degeneration incompatible with life causes no glycosuria.

The only cases of renal diabetes is that produced experimentally by phloridzin. This is the only condition in which there is not an accompanying hyperglycaemia. The works of MacLeod on the relation of the adrenal showed that the action of the secretion of this gland was only effective when the integrity of the nerves to the liver were all right. In order to get a mobilization of glycogen and subsequent increase of sugar in the blood by stimulation of the nevers to the liver there must be present in the blood a certain amount of adrenaline. This also works in the reverse direction for no matter how much adrenaline there is in the blood no hyperglycaemia will result without the action of the nerves. From these experiments it seems evident that it is an inability of the body to oxidize the sugars rather than an over production of them that leads to glycosuria.

So far no cure has been affected but the disease has been alleviated a great deal by proper diet. This is one case where the old adage of "an ounce of prevention is worth a pound of cure" holds true. Hygienic condtion of course should be used in every case and the only drugs that have been used are opium and arsenic. The specfic actions if any that drugs have is not understood but their greatest action is indirectly rather than directly in this condition.

Diet then and the determination of the body tolerance for different carbohydrate is the problem in every case of diabetes.

The following foods should be avoided: Liver, thick soups, oysters, potatoes, turnips, parsnips, squash, beets, corn, peas, artichokes, beer, sweet wines, grapes, dates,

figs, currants, rasins, prunes, plumes, and other dried fruits rich in sugar. In mild cases peaches, apricots and stewed green gooseberries may be eaten. Apples should also be omitted.

The following foods can be eaten: Milk with the consent of the physician, soups such as bouillions, ox-tail and turtle; broths of all kinds made from meat, all the muscular parts of the ox, calf, sheep, pig, deer, wild and domestic birds, tongue, heart, brain, sweetbreads, kidney and all kinds of dried and smooked meats and fish. Eggs can also be eaten. Of the vegetables lettuce, watercress, spinach, cucumbers, onions, asparagus, cauliflower, red and white cabbage and french beans. Preserved vegetables such as olives, pickles and sauerkraut can be eaten. All kinds of cheese and spices can be used. Of the beverages all kinds of natural and carbonated waters, either clear or with lemon juice, or with rum, whisky, cognac, cherry brandy, light moselle or Rhine wines, claret, dry sherry or burgundy in amounts prescribed by the physician. Coffee and tea may be used without cream or sugar or may be sweetned with saccharin. Gluten bread has been used but is not of as much help as was at first thought.

To determine the tolerance of the patient, a slow decrease in all carbohydrate food should be started until finally none is given at all and this continued until the patient shows no more sugar in the urine. If necessary, a complete starvation is resorted to in order to get the patient in a sugar free condition. If this treatment does not suffice to cause disappearance of the sugar from the urine we know that the body

proteins are yielding the sugar portion of their molecule and a complete sugar free condition can not be obtained. The prognosis in these cases are of course very bad. After the patient has been rendered sugar free, the method of determing the tolerance is the same as has been followed in the study of this case and is explained below.

The history of the case presents several interesting features. In the first place, the patients mother died of diabetes. The patient is woman of fifty six years of age, and ways about one hundred and sixty pounds. The patient has weighed in the past over two hundred pounds; and is of a marked nervous temperment. In early childhood, she suffered an attack of spinal meningitis. At the age of thirty, she suffered an attach of nervous prostration, and gives a history of being extremly nervous from childhood. Since this there has been no serious illness until in December ninteen hundred and fourteen, a slight haemorrhage in the retina of the right eye caused partial blindness in the lower right quadrent of this eye. An operation removed the bleb thus formed and the retina readhered in some places. No further complications from this has arisen..Just how long the condition of glycosuria had existed before it was discovered·is not known, but she never complained of a condition of polyuria. When it was discovered that sugar was present the amount of urine was ranging between two thousand and two thousand five hundred cubic centimeters for the twenty four hours and contained between five and one half and six per cent of glucose. This was two months before the following experiments on diet and its relation to the glycosuria began. In these two months, she

became sugar free on proper diet. Neither acetone or diacetic acid were found in the urine at the time of the discovery of the glycosuria. On May sixteenth nineteen hundred and sixteen, Dr. Evans made a physical examination with a blood and urine analysis. In the urine analysis, the specific gravity was 1.011 and only varied from the normal in containing a trace of albumen. The result of the blood was;

Haemoglobin	85%
Erythrocytes	5,930,000
Leucocytes	7,620
Polymorphoneucleat Lencocytes	
Neutrophiles	56
Eosinophiles	2
Transitionals	3
Large mononuclears	1
Lymphocytes	38

The blood sugar before the noon meal was 0.08 per cent and after this meal 0.16 per cent. The meal consisted of a piece of pork, a piece of cheese, a table spoonful of spaghitti and two pieces of toast.

The systolic blood pressure was 202 millimeters of mercury and the diastolic 138 millimeter. The pulse pressure therefore is 64 millimeters.

The heart sounds were as follows; first sound muffled and murmurs could be devloped on exercise; the seond sound was split and the second aortic was accentuated and ringing. His diagnosis was a chronic intitial nephrities with a moderate degree of arterial sclerosis.

II The problem in this case consisted of determination of the carbohydrate tolerance of a diabetic patient of different carbohydrates. The diets were varied and several were given simultaneously or given in particular sequence to deter-

mine what effect, if any, the order of the different diets might have. In this way, an attempt was made to determine whether the patient could tolerate the one diet or the mixture. For instance, a diet would be given in varing quantity for several days until pathelogical quantities of sugar appeared in the urine or until it was evident that fairly large amounts would not cause glycosuria. This would be repeated for another diet and then the two would be combined or one would follow the other. In several cases, the immediate glycosuria following a certain diet gave quick evidence of the inability of the body to utilize this carbohydrate. The quantity of the diets were also varied within limits of comfort to the patient, that is gorging was not attempted. In this way, the tolerance of the body for these different carbohydrates was determined both singly and in combination. The amount of protein given was not limited to any special quantity in any diet, except in one where increasing amounts of meat were given to see if the sugar portion of the protein molecule was being used by the body. An attempt was also made to determine whether any beneficail effects were derived from the constant feeding of certain carbohydrates.

III The technique and determination that were made each day were specific gravity by means of a urinometer, the volume in cubic centimeters for twenty four hours, the reaction toward litmus, the number of cubic centimeters of normal tenth sodium

hydroxide which would neutralize twentyfive cubic centimeters of the urine, the number of cubic centimeters of normal tenth sodium hydroxide which would neturalize the entire twenty four hours output of urine, the number of cubic centimeters of normal tenth ammonia in twenty five cubic centimeters of urine, the number of cubic centimeters of normal tenth ammonia in the twenty four hours urine, the grams of sugar excreated, the number of cubic centimeters of undiluted urine required to reduce ten cubic centimeters of the Fehling's mixture, and the per cent of sugar present in the twenty four hours urine. The preservative used thruout was tincture of thymol. The Fehling's reagents were used in determining the quantity of sugar present. These reagents are made up as follows: 34.64 grams of pure crystalline copper sulphate is dissolved in one thousand cubic centimeters of water and two or three drops of sulphuric acid added. This is solution one. Solution two is made by dissolving 173 grams of Rochelle salt (sodium potassium tartrate) in 100 cubic centimeters of sodium hydroxide of 1.34 specfic gravity and the volume made up to 1000 cubic centimeters with distilled water., Five cubic centimeters each of these solutions when mixed will reduce fifty milligrams of glucose. In making a determination, the ten cubic centimeters of the Fehling's solution were diluted to fifty cubic centimeters with distilled water and the urine so diluted that it contained not over one per cent of sugar. Several trails were made to get the approximate number of cubic centimeters of the urine required to reduce the ten cubic centimeters of Fehling's solution. This was

done so that the time of boiling of the solution was never over three minutes. The Fehling's solution was always boiled before adding the urine which was measured thru a burette. The outside indicator that was used, was made up as follows; 50 milligrams of starch one boiled in fifty cc of water for five minutes after which 10 grams of potassium iodide were added, dissolved and the whole made up to 100cc. To test for the end point, 1cc of the starch iodide solution is acidified with four or five drops of glacial acetic acid and one drop of the boiling Fehling's urine solution added. If there be any copper sulphate present, the soultion become blue do to the copper sulphate liberating iodine from the potassium iodide and the free iodine then reacts with the starch to cause the blue color. This is a very sensitive indicator. The calculation was made by first obtaining the number of cc of undiluted urine required to reduce the 10cc of Fehlings From this the following equation is derived.

Number of cc of undiluted urine required to reduce 10cc of Fehling :0.05 :: 100 : X

X- The per cent of sugar in the urine.

In order to obtain the number of grams of sugar in the whole twenty four hours urine, the following equation was used.

Number of cc of undiluted urine. required to reduce 10cc Fehlings : 0.05 :: The volume of urine for twenty four hours : X

X- the number of grams of glucose in the twenty four hour sample of urine.

The acidy was determined by direct titration of 25cc of the urine to which had been added 15 grams of potassium oxalate. The oxalate is added here to precipitate the

calcium which interferres with the sharpness of the end point by precipitating as earthy phosphates on titration with caustic alkalies. The solution is also rendered white by this preapitation of calcium oxalate. A standard normal tenth solution of sodium hydroxide with a few drops of saturated phenolphthalein for an indicator was used to titrate with. The end point is a distinct permanent pink color.

The number of cubic centimeters of normal tenth sodium hyrdoxide required to neutralize the entire twenty four hour urine is obtained by the following equation.

Number of cc n/10 NaOH : 25 :: X number of cc of urine
required to neutralize 25cc in the twenty four hours.
of urine

The ammonia is determined by adding 10cc of neutralized formaline to the solution after titrating the acidity and again titrating the acidity developed. This gives the number of cubic centimeters of normal tenth ammonium hydroxide. This is true because the formalin reacts with ammonium salts and yeilds hexamethylenetetramine according to the following equation:

$4NH_4\ Cl\quad 6HOCH - C_6\ H_{12}\ N_4\quad 6\ H_2\ O\quad 4HCl$. The acid liberated therefore is directly proportional to the ammonia destroyed. The number of cubic centimeteres of normal tenth ammonium hydroxide that the twenty four hours sample of urine contains is obtained by the following equation:

Number of cc of n/10 NH_4OH: 25 :: X : number of cc of urine
in 25cc of urine in the twenty four
hour sample.

X - the number of cc of normal ammonia in the
twenty four hours urine.

The total grams of ammonia was calculated in the following manner.

Example:-

9.2cc n/10 NH_3 in 25cc sample of urine found by titration.

$$\begin{array}{l} 60 - \text{Factor} \\ 25\overline{)1500} - \text{total amount of urine} \end{array}$$

60 X 9.2 - 552cc n/10 NH_3 in 1500 cc the total amount of urine.

1.7 Grams of NH_3 per liter of n/10 NH_3

552 cc is 0.552 of a liter 552 ÷ 1000 = 0.552

one liter contains 1.7 grams of NH_3 then 0.552 liter contains 1.7 X 9.552 = .9384 Grams of NH_3 in the 1500cc of urine.

The number of cubic centimeters of normal tenth ammonia in the twenty four hour sample of urine is obtained as shown in the above calculation.

IV The following are the diets used at various times thruout the experiment: wheat bread, rye bread, bran bread, graham bread, potatoes, oat meal, corn flakes, dried peaches, tapioca, dried prunes, corn meal, Boston baked beans, shredded wheat, Horlicks Malted milk, Lima beans, rice, oranges, toast, peas, kidney benas, spaghitte and large amounts of meat. Oatmeal was eaten in combination with all of thesediets.

VI Conclusions and Results.

From this study, it is seen that this patient could not tolerate even small amounts of potatoe starch. The wheat starch found in bread was likewise not well tolerated but much better so than the potatoe starch. It was to be expected that the fruits would not be tolerated due to their sugar content. Occasionally in her work of preparing meals the patient would taste some food. If potatoes were tasted in even small amounts the result was invariably the appearance of sugar in the urine. Potatoe seemed almost toxic in the small amount required to produce this result. Sugars and wheat strach were but slightly less striking in their effect. This showed very conclusively the sensitiveness of the patient to sugar, potatoes starch and wheat starch. The other carbohydrates were used by the body without any glycosuria except when the patient was under or had been under any great mental or physical strain.. The nervous condition of the patient therefore materially effected the tolerance of the body for carbohydrate food. Oat meal seemed to be particularly well tolerated and seemed even to raise the tolerance for other carbohydrates. No glycosuria was produced when oat meal was fed in large amounts. When bread was toasted, it seemed to be well tolerated and possibly had as benifical an effect as did the oatmeal.

TABLES.

Day	Volume in cc	Specific Gravity	25cc of Urine cc $\frac{n}{10}$ Acid	Total Urine cc $\frac{n}{10}$ Acid	25cc of Urine cc $\frac{n}{10}$ NH 3	Total Urine cc $\frac{n}{10}$ NH 3	Grams of Sugar No. of cc of Undiluted Urine to Reduce 10cc Fehlings Solution	% Sugar	Remarks
Oct.23	1000	1.023	3.2	128cc	5.2cc	208	Free	.	Wheat bread only
Oct.24	1200	1.025	8.0	384cc	11.8cc	570	Free		Wheat bread only
Oct.25	2000	1.017	4.4	352cc	9.0cc	720	Free		Wheat bread only
Oct.26	1500	1.020	5.0	300cc	10.0cc	600	2.6 Gm. 28cc	.18%	
Oct.27	1500	1.021	3.8	228cc	9.2cc	545	2.4 Gm. 32cc	.15%	
Oct.28	450	1.025	9.0	162cc	14.6cc	270	Free		
Oct.29	500	1.030	14.6	292cc	21.4cc	440	Free		
Oct.30	800	1.022	9.0	288cc	13.0cc	416	Free		
Oct.31	1300	1.021	5.6	291cc	8.8cc	450	Free		
Nov. 1	600	1.020	6.0	144cc	8.6cc	206	Free		
Nov. 2	1300	1.020	4.4	229cc	7.2cc	374	Free		
Nov. 3	1300	1.018	5.6	291cc	7.4cc	385	Free		
Nov. 4	1100	1.017	7.0	308cc	9.4cc	413	1.37 Gm. 40cc	.125%	
Nov. 5	1000	1.019	8.0	320cc	11.6cc	464	Free		
Nov. 6	1200	1.018	5.8	278cc	9.8cc	470	Free		

Day	Volume in cc	Specific Gravity	25cc of Urine cc $\frac{n}{10}$ Acid	Total Urine cc $\frac{n}{10}$ Acid	25cc of Urine cc $\frac{n}{10}$ NH_3	Total Urine cc $\frac{n}{10}$ NH_3	Grams of Sugar No. of cc of Undiluted Urine to Reduce 10cc Fehlings Solution	% Sugar	Remarks
Nov. 7	900	1.017	3.4	122cc	10.0cc	470	Free		
Nov. 8	1200	1.020	7.0	336cc	12.4cc	595	Free		
Nov. 9	900	1.023,	8.4	302cc	13.4cc	482	Free		
Nov.10	1200	1.020	8.6	412cc	10.0cc	480	Traces		
Nov.11	1100	1.019	6.4	282cc	10.8cc	475	Traces		
Nov.12	900	1.026	8.4	286cc	14.0cc	504	Traces		
Nov.13	1100	1.023	9.2	404cc	12.0cc	528	Free		
Nov.14	1100	1.020	7.0	308cc	10.6cc	466	Free		
Nov.15	600	Lost (broken bottle)							
Nov.16	1100	1.022	6.6	290cc	11.0cc	484	Free		Bread Stopped
Nov.17	1100	1.020	5.4	237cc	10.4cc	458	Free		Potatoes Started
Nov.18	900	1.026	7.4	266cc	12.0cc	432	Free		2 Oz. Potatoes
Nov.19	1700	1.020	3.0	204cc	6.8cc	462	1.89Gm. 45cc	.11%	
Nov.20	1500	1.022	3.0	180cc	6.0cc	360	Traces		
Nov.21	1700	1.018	3.2	2.7cc	6.0cc	408	2.43 Gm. 35cc	.14%	
Nov.22	500	1.032	11.2	224cc	12.8cc	256	2.5 Gm. 10cc	.5%	4 Oz. Potatoes

Day	Volume in cc	Specific Gravity	25cc of Urine cc $\frac{n}{10}$ Acid	Total Urine cc $\frac{n}{10}$ Acid	25cc of Urine cc $\frac{n}{10}$ NH 3	Total Urine cc $\frac{n}{10}$ NH 3	Grams of Sugar No. of cc of Undiluted Urine to Reduce 10cc Fehlings Solution	% Sugar	Remarks
Nov.23	700	1.030	10.2	285cc	12.2cc	342	3.18 11cc	.45%	Potatoes Stopped here
Nov.24	1100	1.024	7.4	325cc	9.6cc	422	Traces		
Nov.25	1300	1.018	4.6	239cc	7.4cc	385	Traces		
Nov.26	750	1.027	12.0	360cc	16.4cc	492	Free		
Nov.27	1250	1,018	4.6	230cc	8.0cc	450	Free		
Nov.28	1300	1.020	8.0	416cc	12.2cc	634	Free		
Nov.29	1500	1.024	8.0	480cc	13.8cc	828	Traces		
Nov.30	1250	1.024	7.0	350cc	11.0cc	550	Free		
Dec. 1	1600	1.019	5.4	345cc	10.4cc	665	Free		First day of oat meal
Dec. 2	1700	1.019	5.0	340cc	10.2cc	693	Free		
Dec. 3	1700	1.017	5.4	367cc	10.0cc	680	Minute Traces		
Dec. 4	2200	1.017	4.8	422cc	10.0cc	880	Minute Traces		
Dec. 5	1800	1.020	6.2	446cc	12.4cc	893	Traces		
Dec. 6	2000	1.020	5.0	400cc	11.6cc	928	Free		
Dec. 7	1400	1.023	5.0	280cc	14.6cc	812	Free		
Dec. 8	1300	1.025	8.6	447cc	14.0cc	728	6.5 Gm. 10cc	.15%	dough nuts

Day	Volume in cc	Specific Gravity	25cc of Urine cc $\frac{n}{10}$ Acid	Total Urine cc $\frac{n}{10}$ Acid	25cc of Urine cc $\frac{n}{10}$ NH 3	Total Urine cc $\frac{n}{10}$ NH 3	Grams of Sugar No. of cc of Undiluted Urine to Reduce 10cc Fehlings Solution	% Sugar	Remarks
Dec. 9	1900	1.019	5.6	425cc	9.6cc	759	Free		
Dec.10	1400	1.016	6.1	442cc	10.0cc	560	Free		
Dec.11	1200	1.020	8.8	422cc	14.2cc	681	Free		Oat meal stopped here
Dec.12	750	1.020	10.4	312cc	15.4cc	762	Free		
Dec.12	600	1.025	9.2	220cc	16.2cc	389	Free		Corn flakes started here
Dec.14	550	1.026	9.0	198cc	15.4cc	329	Free		
Dec.15	1000	1.019	3.6	144cc	7.4cc	296	Free		
Dec.16	1700	1.012	3.0	204cc	6.2cc	421	Free		
Dec.17	1200	1.016	3.6	173cc	6.2cc	298	Free		
Dec.18	1300	1.019	3.6	187cc	7.0cc	364	Free		
Dec.19	1000	1.020	7.4	296cc	11.2cc	448	Free		
Dec.20	500	1.029	13.8	276cc	20.0cc	400	Free		
Dec.21	600	1.022	11.4	274cc	20.4cc	489	Free		
Dec.22	1050	1.019	6.2	260cc	14.0cc	588	Free		Corn flakes stopped here
Dec.23	1500	1.016	3.4	204cc	8.2cc	482	Free		
Dec.24	1650	1.015	3.6	239cc	7.0cc	462	Free		Malted milk started here

Day	Volume in cc	Specific Gravity	25cc of Urine cc $\frac{n}{10}$ Acid	Total Urine cc $\frac{n}{10}$ Acid	25cc of Urine cc $\frac{n}{10}$ NH 3	Total Urine cc $\frac{n}{10}$ NH 3	Grams of Sugar No. of cc of Undiluted Urine to Reduce 10cc Fehlings Solution	% Sugar	Remarks
Dec.25	1200	1.017	7.0	336cc	9.4cc	451	Free		1/3 cup per day
Dec.26	1050	1.027	8.8	369cc	12.0cc	504	5.25 Gm. 10cc	.50%	Dough nut
Dec.27	1200	1.020	6.2	297cc	10.0cc	480	Free		
Dec.28	1400	1.018	5.8	325cc	7.6cc	425	Free		
Dec.29	1500	1.020	5.8	348cc	6.6cc	396	6.8 Gm. 11cc	.46%	Tasted food in Cooking
Dec.30	1500	1.018	6.8	408cc	8.4cc	504	Free		
Dec.31	900	1.025	8.0	228cc	9.0cc	324	Traces		
Jan. 1	1400	1.020	5.2	291cc	6.2cc	347	Free		
Jan. 2	1450	1.015	4.2	243cc	6.2cc	360	Free		
Jan. 3	1500	1.015	3.8	228cc	6.2cc	372	Free		
Jan. 4	1000	1.026	14.0	560cc	14.8cc	592	Free		Dried peaches
Jan. 5	1100	1.025	10.0	440cc	11.0cc	484	3.87 Gm. 14.2cc	.34%	
Jan. 6	1050	1.025	9.6	403cc	9.6cc	403	Free		Stopped peaches
Jan. 7	1350	1.020	6.0	324cc	7.2cc	389	Free		Tapico
Jan. 8	1500	1.018	6.6	396cc	8.4cc	304	Free		
Jan. 9	1200	1.022	6.8	326cc	10.0cc	480	Traces		

Day	Volume in cc	Specific Gravity	25cc of Urine cc $\frac{n}{10}$ Acid	Total Urine cc $\frac{n}{10}$ Acid	25cc of Urine cc $\frac{n}{10}$ NH_3	Total Urine cc $\frac{n}{10}$ NH_3	Grams of Sugar No. of cc of Undiluted Urine to Reduce 10cc Fehlings Solution	% Sugar	Remarks
Jan.10	1550	1.017	4.6	285cc	7.2cc	446	Free		Considerable meat
Jan.11	900	1.025	9.2	331cc	12.8cc	461	Free		
Jan.12	1200	1.020	9.0	216cc	9.0cc	432	Free		
Jan.13	1400	1.020	5.8	324cc	7.4cc	441	Free		
Jan.14	1000	1.024	9.4	376cc	11.2cc	448	Free		Started corn meal and bran
Jan.15	1200	1.020	5.4	259cc	7.4cc	355	Free		
Jan.16	1500	1.016	3.2	192cc	6.4cc	384	Free		
Jan.17	1200	1.019	3.2	154cc	8.8cc	422	Free		
Jan.18	1200	1.026	5.0	240cc	10.0cc	480	Traces		Testing while cooking
Jan.19	1600	1.019	3.6	115cc	7.4cc	475	Free		
Jan.20	1400	1.020	4.8	269cc	8.8cc	493	Free		
Jan.21	1000	1.020	3.8	152cc	8.2cc	328	Free		
Jan.22	1600	1.020	5.4	259cc	7.8cc	374	Free		
Jan.23	1600	1.019	4.8	307cc	7.0cc	440	Free		Corn meal stopped here
Jan.24	1250	1.021	6.4	320cc	10.0cc	500	Free		Beans started here

Day	Volume in cc	Specific Gravity	25cc of Urine cc $\frac{n}{10}$ Acid	Total Urine cc $\frac{n}{10}$ Acid	25cc of Urine cc $\frac{n}{10}$ NH_3	Total Urine cc $\frac{n}{10}$ NH_3	Grams of Sugar of cc of Undiluted Urine to Reduce 10cc Fehlings Solution	% Sugar	Remarks.
Jan.25	1600	1.021	5.6	358cc	8.8cc	563	Free		
Jan.26	1700	1.015	4.2	285cc	7.4cc	503	Free		
Jan.27	1200	1.022	7.6	365cc	9.4cc	451	Free		
Jan.28	1500	1.020	4.8	288cc	7.2cc	432	Free		Beans stopped here
Jan.29	1600	1.020	6.2	397cc	7.6cc	486	Free		
Jan.30	1300	1.019	6.4	333cc	10.2cc	530	Free		Shreded wheat started
Jan.31	1000	1.021	9.2	368cc	14.8cc	592	Traces		
Feb. 1	1000	1.021	8.2	328cc	12.8cc	512	Traces		
Feb. 2	1300	1.020	5.8	301cc	11.0cc	572	Free		
Feb. 3	1000	1.026	9.2	364cc	14.8cc	592	Free		
Feb. 4	900	1.025	12.0	432cc	16.6cc	497	Free		
Feb. 5	1000	1.023	9.6	374cc	13.4cc	536	Free		
Feb. 6	1300	1.019	5.6	291cc	9.2cc	478	Traces		
Feb. 7	900	1.023	9.6	345cc	14.2cc	511	Traces		Shreded Wheat stopped here
Feb. 8	1600	1.018	3.6	230cc	6.8cc	435	Free		
Feb. 9	1600	1.020	3.4	217cc	7.4cc	471	Free		Horlick malted milk
Feb.10	1100	1.021	5.0	220cc	8.2cc	361	Free		

Day	Volume in cc	Specific Gravity	25cc of Urine cc $\frac{n}{10}$ Acid	Total Urine cc $\frac{n}{10}$ Acid	25cc of Urine cc $\frac{n}{10}$ NH 3	Total Urine cc $\frac{n}{10}$ NH 3	Grams of Sugar No. of cc of Undiluted Urine to Reduce 10cc Fehlings Solution	% Sugar	Remarks
Feb.11	1600	1.020	7.2	461cc	11.4cc	729	Free		
Feb.12	1250	1.020	6.0	300cc	10.0cc	500	Free		
Feb.13	1400	1.025	5.0	280cc	10.0cc	560	Free		
Feb.14	1200	1.021	6.2	297cc	10.4cc	499	Free		
Feb.15	1600	1.020	5.0	320cc	8.4cc	537	Free		
Feb.16	1800	1.020	6.2	460cc	13.0cc	936	Free		Prunes started here
Feb.17	1600	1.018	6.0	384cc	12.0cc	768	Traces		
Feb.18	1600	1.020	6.2	397cc	11.4cc	729	8.00 Gm. 10cc	.5%	
Feb.19	1150	1.020	7.8	358cc	9.0cc	414	Traces		
Feb.20	1250	1.022	4.8	240cc	10.4cc	520	Free		Lima beans started
Feb.21	1250	1.020	4.6	230cc	10.8cc	540	Free		
Feb.22	900	1.020	8.8	317cc	13.0cc	488	Free		
Feb.23	1300	1.020	6.8	353cc	11.6cc	603	Traces		
Feb.24	1000	1.020	7.2	288cc	12.0cc	480	Free		
Feb.25	1600	1.018	4.6	294cc	8.0cc	512	Free		Lima beans stopped here
Feb.26	1700	1.019	4.0	272cc	7.0cc	476	Free		Rice started
Feb.27	1500	1.018	5.6	336cc	8.2cc	492	Free		
Feb.28	1250	1.018	6.2	300cc	10.0cc	500	Free		
Feb.29	1400	1.019	5.0	280cc	9.6cc	537	Free		

Day	Volume in cc	Specific Gravity	25cc of Urine cc $\frac{n}{10}$ Acid	Total Urine cc $\frac{n}{10}$ Acid	25cc of Urine cc $\frac{n}{10}$ NH 3	Total Urine cc $\frac{n}{10}$ NH 3	Grams of Sugar No. of cc of Undiluted Urine to Reduce 10cc Fehlings Solution	% Sugar	Remarks
Mar. 1	1800	1.019	5.6	403cc	8.2cc	590	**Free**		
Mar. 2	1250	1.017	5.0	250cc	9.2cc	460	**Free**		
Mar. 3	1150	1.019	6.4	294cc	10.2cc	469	**Free**		
Mar. 4	800	1.017	5.0	160cc	9.4cc	300	**Free**		Rice stopped here
Apr. 9	1700	1.018	6.0	408cc	9.8cc	666	**Free**		
Apr.10	1300	1.019	9.6	499cc	14.4cc	789	**Free**		Oat meal and bran bread
Apr.11	1200	1.022	9.2	442cc	14.2cc	681	**Free**		
Apr.12	1550	1.020	5.2	322cc	11.4cc	707	**Free**		
Apr.13	1600	1.019	5.8	371cc	10.4cc	685	**Free**		
Apr.14	1600	1.018	5.4	345cc	8.8cc	563	**Free**		
Apr.15	1800	1.019	6.0	432cc	9.0cc	728	**Free**		Above stopped here
Apr.16	1700	1.020	6.0	408cc	10.0cc	680	**Free**		
Apr.17	1200	1.024	11.4	547cc	15.2cc	729	**Free**		An orange and bran bread
Apr.18	1700	1.022	7.6	516cc	10.0cc	680	**Free**		
Apr.19	1600	1.021	8.4	537cc	10.8cc	691	**Free**		
Apr.20	1200	1.025	10.6	509cc	14.0cc	672	**Free**		

Day	Volume in cc	Specific Gravity	25cc of Urine cc $\frac{n}{10}$ Acid	Total Urine cc $\frac{n}{10}$ Acid	25cc of Urine cc $\frac{n}{10}$ NH 3	Total Urine cc $\frac{n}{10}$ NH 3	Grams of Sugar No. of cc of Undiluted Urine to Reduce 10cc Fehlings Solution	% Sugar	Remarks
Apr.21	1500	1.019	8.0	480cc	11.6cc	696	Free		
Apr.22	1800	1.018,	5.6	403cc	9.4cc	677	Free		
Apr.23	1500	1.020	5.0	300cc	8.0cc	480	Free		
Apr.24	1550	1.017	17.0	434cc	11.2cc	694	Free		Oats
Apr.25	1500	1.017	4.6	276cc	10.4cc	644	Free		Graham bread
Apr.26	1100	1.020	6.0	264cc	13.0cc	572	Free		Toast
Apr.27	1750	1.014	4.0	280cc	8.4cc	616	Free		Toast
Apr.28	1400	1.015	4.0	224cc	9.8cc	549	Free		Peas
Apr.29	1200	1.019	6.0	288cc	10.2cc	489	Free		Peas
Apr.30	2000	1.010	3.8	304cc	8.2cc	656	Free		Peas
May 1	1400	1.012	3.2	179cc	8.2cc	459	Free		Peas
May 2	1200	1.017	3.8	182cc	9.4cc	441	Free		Kidney beans
May 3	1600	1.015	3.8	243cc	6.8cc	435	Free		Kidney beans
May 4	1200	1.020	6.2	297cc	9.8cc	470	Free		Kidney beans
May 5	1550	1.014	6.0	372cc	10.0cc	500	Free		cookey
May 6	2000	1.011	2.4	192cc	8.0cc	640	Free		Dates
May 7	2000	1.014	4.0	320cc	7.8cc	604	Free		Spaghetti
May 8	1200	1.016	6.2	297cc	11.4cc	547	Free		Orange
May 9	1600	1.016	3.6	230cc	8.6cc	550	Free		Orange
May 10	1800	1.014	4.0	288cc	5.6cc	403	Free		Oat meal

Day	Volume in cc	Specific Gravity	25cc of Urine cc $\frac{n}{10}$ Acid	Total Urine cc $\frac{n}{10}$ Acid	25cc of Urine cc $\frac{n}{10}$ NH_3	Total Urine cc $\frac{n}{10}$ NH_3	Grams of Sugar No. of cc of Undiluted Urine to Reduce 10cc Fehlings Solution	% Sugar	Remarks
May 11	1400	1.018	2.8	159cc	8.6cc	481	Free		
May 12	1800	1.018	3.0	215cc	7.4cc	533	Free		Bran
May 13	1800	1.020	6.0	430cc	8.8cc	633	Free		

Approved Harold C. Bradley

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